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| Title          | <b>Details of SDD Section 11.9.2.2 Uplink HARQ Feedback Channel</b>  |
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| Re:            | SDD Session 56 Cleanup, Call for PHY Details   |
| Abstract       | This is revised version of Section 11.6 of IEEE 802.16m-08/003r4. This document provides further physical layer details.   |
| Purpose        | Draft for further development of the IEEE 802.16m SDD  |
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## 1 Details of SDD Section 11.9.2.2 Uplink HARQ Feedback Channel

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### 2 11.9.2.2 UL HARQ Feedback Channel

3 This channel is used to carry HARQ feedback information.

#### 4 11.9.2.2.1 Multiplexing with other control channels and data channels

5 The UL HARQ feedback channel starts at a pre-determined offset with respect to the corresponding DL  
6 transmission. The starting location of UL HARQ feedback is pre-determined with the size defined in a DL  
7 broadcast control message. The UL HARQ feedback for persistent allocation shall be allocated before UL  
8 HARQ feedback for other allocations.

9 The UL HARQ feedback channel is FDM with other control and data channels.

10 Multiple HARQ feedback channels are multiplexed within one physical resource allocation unit as described in  
11 Section 11.9.2.2.2.

Deleted: Orthogonal signaling is used  
to multiplex m

12 To support DL subframe bundling, one HARQ feedback is allocated corresponding to one DL allocation across  
13 multiple DL subframes that are bundled together.

#### 14 11.9.2.2.2 PHY structure

15 UL HARQ feedback channel is BPSK modulated. Transmit power of HARQ feedback channel is adaptively  
16 adjusted to the channel fading according to UL power control.

17 Twelve UL HARQ feedback channels are multiplexed together using a mixture of FDM/TDM/CDM in three  
18 UL DRU tiles. For each group of four tones that are adjacent in time and frequency, pilot and data symbols  
19 from four HARQ feedback channels are CDMed together in order to take full advantage of the MS transmit  
20 power. Further, since these four tones are adjacent in time and frequency, orthogonal codes can be used to  
21 separate the four HARQ feedback channels. Finally, multiple groups of four tones are allocated in each tile  
22 with FDM/TDM. The pilot and data tone allocations are shown in Figure 1.  
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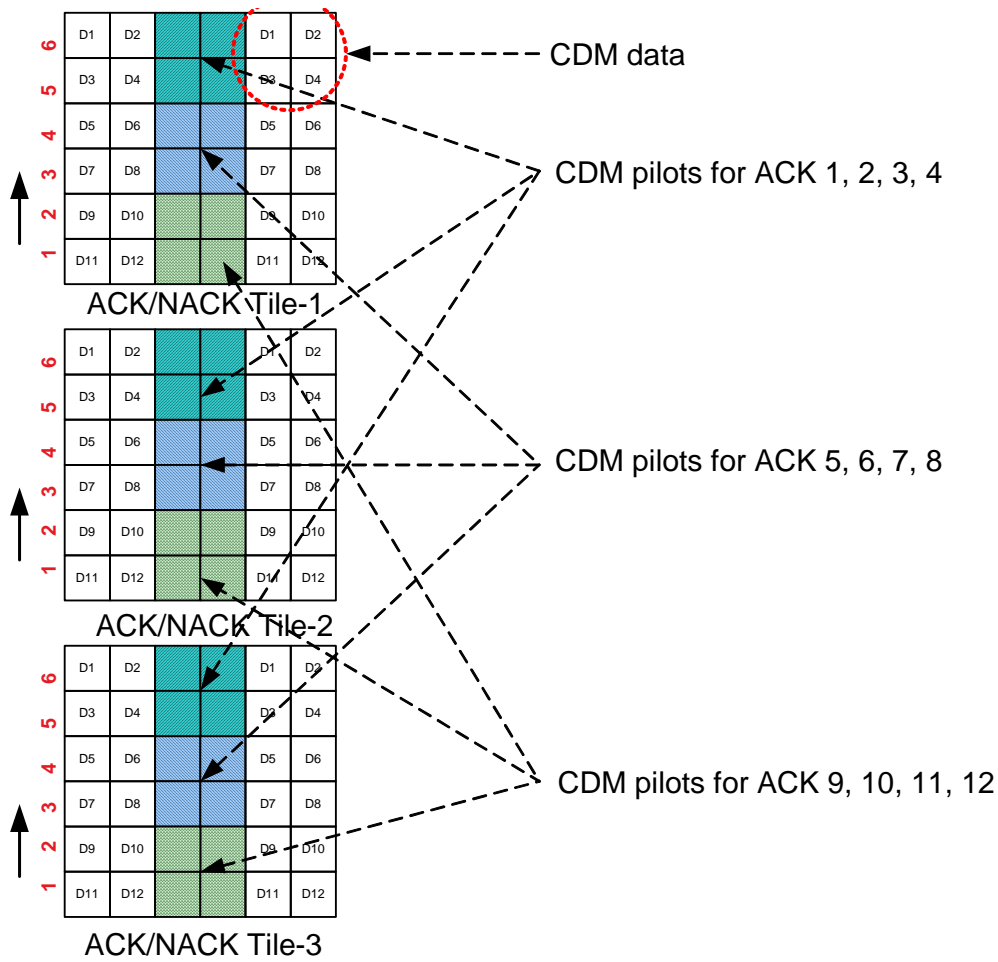


Figure 1. UL HARQ feedback channel pilot and data Tone allocations

In order to improve the coverage of HARQ feedback channel for cell edge MSs, the UL HARQ feedback tiles are allocated in time dimension first as shown in Figure 2. Further, subframe based frequency hopping of the tiles can be applied to improve the frequency diversity.

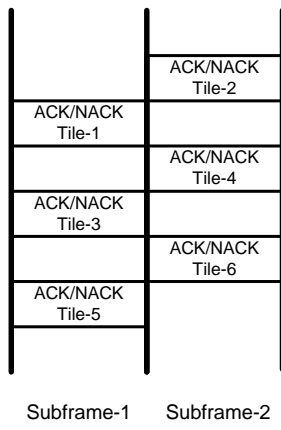


Figure 2. UL HARQ feedback tile allocations

**Deleted:** The structure of UL HARQ feedback channel resource blocks, pilots and resource mapping are TBD.¶